```
import pandas as pd
import numpy as np
import statsmodels.api as sm
import seaborn as sns

# In order to download to drive we mount our google drives to colab.
from google.colab import drive
drive.mount('/content/drive')
```

```
/usr/local/lib/python3.7/dist-packages/statsmodels/tools/_testing.py:19: FutureWarning:
  import pandas.util.testing as tm
Mounted at /content/drive
```

Data Cleaning

```
groups = pd.read_excel("/content/drive/My Drive/EC 438 experiment/Treatment.xlsx").iloc[[0,3,

groups = groups.T
groups.columns = ["name", "gm1", "gm2", "gm3"]
groups.gm1 = groups.gm1.apply(lambda x: int(x[0:x.find(":")]))
groups.gm2 = groups.gm2.apply(lambda x: int(x[0:x.find(":")]))
groups.gm3 = groups.gm3.apply(lambda x: int(x[0:x.find(":")]))

groups = groups.reset_index(drop=False , )
groups = groups.rename(columns= {"index" : "tr2_id"})
groups.tr2_id = groups.tr2_id.apply(lambda x: x[3:]).astype(int)

gr_dict = {}
j=0
for i in groups.index:
  my_gr = set(groups.loc[i, ["tr2_id", "gm1", "gm2", "gm3"]].values)
  if my_gr in gr_dict.values():
    groups.loc[i, "group"] = list(gr_dict.keys())[list(gr_dict.values()).index(my_gr)]
  else:
    j += 1
    gr_dict["group_" + str(j)] = my_gr
    groups.loc[i, "group"] = "group_" + str(j)

groups
```

	tr2_id	name	gm1	gm2	gm3	group
0	1	Elif Kurt	2	28	29	group_1
1	2	Ipek Gur	28	1	29	group_1
2	3	yunus emre bilgili	23	14	4	group_2
3	4	gokhan seheri	3	23	14	group_2
4	5	cem erciyastepe	21	7	39	group_3
5	6	su akarsu	27	34	37	group_4
6	7	Kaan Basdil	21	5	39	group_3
7	8	emrecan yerlikaya	30	31	20	group_5
8	9	Evrim Belli	25	26	10	group_6
9	10	oguz turan	25	26	9	group_6
10	11	Halit Metin	32	35	18	group_7
11	12	Ramazan Do ukan Oz	24	22	33	group_8
12	13	sonnur bas	40	36	38	group_9
13	14	elif canga	3	23	4	group_2
14	15	feritalperen ulker	16	17	19	group_10
15	16	oyku yilmaz	15	17	19	group_10
16	17	merve zeynep arici	15	16	19	group_10
17	18	Deniz Sertkan	11	32	35	group_7
18	19	Onur Boyaci	15	16	17	group_10
19	20	Merve yalin	30	8	31	group_5
20	21	meltem ozkan	5	7	39	group_3
21	22	Atakan Peker	12	24	33	group_8
22	23	Tayfur Kirilmaz	3	14	4	group_2
23	24	Mehmet Gorkem Oget	12	22	33	group_8
24	25	Mustafa Ozer	26	10	9	group_6
25	26	muhammed huzeyfe elden	25	10	9	group_6
26	27	dilara kurtoglu	34	37	6	group_4
27	28	iraz bolukbasi	2	1	29	group_1
28	29	Baran Demirtas	2	28	1	group_1
29	30	Cuneyt Soral	8	31	20	group_5

30	31	Lutfullah Cinar	30	8	20	group_5
31	32	emircan ince	11	35	18	group_7
32	33	velihan Baspinar	12	24	22	group_8
33	34	Batuhan Aktas	27	37	6	group_4
34	35	said gorur	11	32	18	group_7
35	36	firdevs feyza erdonmez	40	13	38	group_9

```
#groups.to_excel("/content/drive/My Drive/EC 438 experiment/groups.xlsx")
```

```
groups = pd.read_excel("/content/drive/My Drive/EC 438 experiment/groups.xlsx").drop("Unnamed
groups
```

	tr2_id	tr1_id	name	gm1	gm2	gm3	group
0	1	34	Elif Kurt	2	28	29	group_1
1	2	22	Ipek Gur	28	1	29	group_1
2	3	7	yunus emre bilgili	23	14	4	group_2
3	4	40	gokhan seheri	3	23	14	group_2
4	5	18	cem erciyastepe	21	7	39	group_3
5	6	35	su akarsu	27	34	37	group_4
6	7	11	Kaan Basdil	21	5	39	group_3
7	8	9	emrecan yerlikaya	30	31	20	group_5
8	9	15	Evrim Belli	25	26	10	group_6
9	10	14	oguz turan	25	26	9	group_6
10	11	2	Halit Metin	32	35	18	group_7
11	12	13	Ramazan Do ukan Oz	24	22	33	group_8
12	13	5	sonnur bas	40	36	38	group_9
13	14	12	elif canga	3	23	4	group_2
14	15	28	feritalperen ulker	16	17	19	group_10
15	16	6	oyku yilmaz	15	17	19	group_10
16	17	26	merve zeynep arici	15	16	19	group_10
17	18	24	Deniz Sertkan	11	32	35	group_7
18	19	29	Onur Boyaci	15	16	17	group_10

```
tr1_data = pd.read_excel("/content/drive/My Drive/EC 438 experiment/ec 438 - experiment data.
tr1_data
```

	Round	ID	Contribution	Earnings	Cumulative Earnings	Other Id:
0	1	1	0	350.00	360.00	ID7:0, ID40:50, ID30:100
1	1	2	0	293.00	303.00	ID22:0, ID20:93, ID28:0
2	1	3	50	250.00	260.00	ID33:50, ID21:0, ID8:50

```
all_data = pd.read_excel("/content/drive/My Drive/EC 438 experiment/Treatment.xlsx", sheet_na
exp_data = all_data.iloc[0:160, [0,1,2,7,8,9]]
chat_data = all_data.iloc[162:292, 0:2]
chat_data.columns = ["round", "message"]
chat_data.loc[162:195, "round"] = 1
chat_data.loc[195:229, "round"] = 2
chat_data.loc[229:264, "round"] = 3
chat_data.loc[264:, "round"] = 4
chat_data = chat_data.drop([162, 195, 229, 264])
chat_data["id"] = chat_data.message.apply(lambda x: int(x[2:x.find(":")]))
chat_data = chat_data.merge(groups[["tr2_id", "group"]], how = "left", left_on="id", right_on
chat_data
```

	round	message	tr2_id	group
0	1	ID1: ^hepsini koyalm ortaya (1620303967)^cevap...	1	group_1
1	1	ID3: ^yatryor muyuz ya :P (1620303999)	3	group_2
2	1	ID4: ^yatrn :) (1620303971)^yatirin (1620303980)	4	group_2
3	1	ID5: ^100 invest yapmayan dersi droplasn ya (1...	5	group_3
4	1	ID6: ^selam (1620303998)^100 m (1620304012)^10...	6	group_4
...	...	...	...	...
121	4	ID34: ^iyilik yap denize at (1620304668)^100 a...	34	group_4
122	4	ID35: ^durustluk bozuldu galiba kimsenin kimse...	35	group_7
123	4	ID37: ^hic bisi diyemiyorum (1620304650)^priso...	37	group_4
124	4	ID38: ^sylencek bii kalmad dayanma ruhu yok bu...	38	group_9
125	4	ID39: ^son tur rational olan 0 invest etmek am...	39	group_3

126 rows × 4 columns

```
groups = pd.read_excel("/content/drive/My Drive/EC 438 experiment/groups.xlsx").drop("Unnamed
groups = groups.merge(tr1_data.loc[tr1_data.Round==1, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr1_r1_contribution"})

groups = groups.merge(tr1_data.loc[tr1_data.Round==2, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr1_r2_contribution"})

groups = groups.merge(tr1_data.loc[tr1_data.Round==3, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr1_r3_contribution"})
```

```
groups = groups.rename(columns={"Contribution" : "tr1_r3_contribution"})

groups = groups.merge(tr1_data.loc[tr1_data.Round==4, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr1_r4_contribution"})


groups = groups.merge(exp_data.loc[exp_data.Round==1, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr2_r1_contribution"})

groups = groups.merge(exp_data.loc[exp_data.Round==2, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr2_r2_contribution"})

groups = groups.merge(exp_data.loc[exp_data.Round==3, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr2_r3_contribution"})

groups = groups.merge(exp_data.loc[exp_data.Round==4, ["Round", "ID", "Contribution"]], how =
groups = groups.rename(columns={"Contribution" : "tr2_r4_contribution"})

groups
```

	tr2_id	tr1_id	name	gm1	gm2	gm3	group	tr1_r1_contribution	tr1_r2_con
0	1	34	Elif Kurt	2	28	29	group_1	25	
1	2	22	Ipek Gur	28	1	29	group_1	0	
2	3	7	yunus emre bilgili	23	14	4	group_2	0	
3	4	40	gokhan seheri	3	23	14	group_2	50	
4	5	18	cem erciyastepe	21	7	39	group_3	0	
5	6	35	su akarsu	27	34	37	group_4	7	
6	7	11	Kaan Basdil	21	5	39	group_3	0	
7	8	9	emrecan yerlikaya	30	31	20	group_5	100	
8	9	15	Evrim Belli	25	26	10	group_6	45	
9	10	14	oguz turan	25	26	9	group_6	20	
10	11	2	Halit Metin	32	35	18	group_7	0	
11	12	13	Ramazan Do ukan Oz	24	22	33	group_8	35	
12	13	5	sonnur bas	40	36	38	group_9	50	
13	14	12	elif canga	3	23	4	group_2	20	
14	15	28	feritalperen ulker	16	17	19	group_10	0	
15	16	6	oyku yilmaz	15	17	19	group_10	60	
16	17	26	merve zeynep arici	15	16	19	group_10	40	
17	18	24	Deniz Sertkan	11	32	35	group_7	75	
18	19	29	Onur Boyaci	15	16	17	group_10	10	
19	20	16	Merve yalin	30	8	31	group_5	60	
20	21	20	meltem ozkan	5	7	39	group_3	93	
21	22	8	Atakan Peker	12	24	33	group_8	50	
22	23	1	Tayfur Kirilmaz	3	14	4	group_2	0	

23	24	37	Mehmet Gorkem Oget	12	22	33	group_8	79
24	25	31	Mustafa Ozer	26	10	9	group_6	20
25	26	17	muhammed huzeyfe elden	25	10	9	group_6	50
26	27	10	dilara kurtoglu	34	37	6	group_4	2
27	28	4	iraz [illegible]	2	1	29	group_1	30

```
#groups.to_excel("/content/drive/My Drive/EC 438 experiment/groups_and_contributions.xlsx", i
#exp_data.to_excel("/content/drive/My Drive/EC 438 experiment/tr2_data.xlsx", index=False)
#tr1_data.to_excel("/content/drive/My Drive/EC 438 experiment/tr1_data.xlsx", index=False)
#chat_data.to_excel("/content/drive/My Drive/EC 438 experiment/chat_data.xlsx", index=False)
```

Soral

Sentiment Scores:

31	32	3	[illegible]	11	35	18	group_7	50

```
chat_data = pd.read_excel("/content/drive/My Drive/EC 438 experiment/chat_data.xlsx")

sentiment_scores = pd.DataFrame(columns=["sent_score"])
ct=-1
for i,frame in chat_data.groupby(["round", "group"]):
  print("GROUP AND ROUND IS:")
  print(i)
  ct +=1
  for j in frame.message:
    print(j)
  print("Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)")
  sentiment_scores.loc[ct, "round"] = i[0]
  sentiment_scores.loc[ct, "group"] = i[1]

  sentiment_scores.loc[ct,"sent_score"] = float(input())

sentiment_scores.to_excel("sentiment_scores", index=False)
```

```
(1, 'group_1')
ID1: ^hepsini koyalm ortaya (1620303967)^cevap yok glb (1620304000)
ID28: ^evt (1620304045)
ID29: ^A (1620304014)^Ltfen... (1620304024)^100 verelim (1620304033)^Vallahi 100 vericem
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
9
GROUP AND ROUND IS:
(1, 'group_10')
ID15: ^sa (1620303973)^kark (1620304011)^karisik* (1620304018)
ID16: ^selam (1620304011)^100 vermeyi deneyelim bence ilk tur (1620304028)^ben 100e okay
ID17: ^Hepsini invest edelim arkadalar (1620304050)
ID19: ^tabandan balayalm arkadalar (1620304075)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7
GROUP AND ROUND IS:
(1, 'group_2')
ID3: ^yatryor muyuz ya :P (1620303999)
ID4: ^yatrn :) (1620303971)^yatirin (1620303980)
ID14: ^risk averse misin yoksa risk lover msn (1620303999)
ID23: ^sa (1620303987)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5.5
GROUP AND ROUND IS:
(1, 'group_3')
ID5: ^100 invest yapmayan dersi droplasn ya (1620303953)
ID7: ^selam herkese (1620303950)^#melihbuluistifa (1620303998)
ID39: ^gun dayanisma gunudur 100 atalim (1620303982)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
8
GROUP AND ROUND IS:
(1, 'group_4')
ID6: ^selam (1620303998)^100 m (1620304012)^100 mu giricez (1620304022)
ID27: ^ltfen balayalm gnlmzden koptuu kadar bir gven ilikimiz olsun (1620304030)
ID34: ^kim kimi koparyor (1620304011)
ID37: ^100 vermemiz yok mu (1620304058)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
9
GROUP AND ROUND IS:
(1, 'group_5')
ID8: ^100 (1620304058)
ID20: ^birlikten kuvvet doar (1620303998)
ID31: ^net atalm 100 (1620304045)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
9.5
GROUP AND ROUND IS:
(1, 'group_6')
ID9: ^ben de 100 veriyorum (1620304043)
ID10: ^100 veriyorum (1620303970)
ID25: ^arkadalar sizleri saduyuya davet ediyorum (1620304026)^sagduyu* (1620304035)^lutf
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
10
GROUP AND ROUND IS:
(1, 'group_7')
ID11: ^selam (1620303971)^100er verelim (1620303977)^100 vermeyeni (1620303996)^bulurum
ID18: ^Dostlar ful investlesek de 400er kazansak ya temiz (1620303961)
ID32: ^100 atalm abi (1620304036)
ID35: ^50 basyorum (1620304044)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
```

```
8.5
GROUP AND ROUND IS:
(1, 'group_8')
ID12: ^Selam bence 50er invest edelim her raundda (1620303962)^tamamdr (1620303986)
ID24: ^Gzm parada deil dostluk kazansn hepsini invest ediyorum yeminlen (1620304029)
ID33: ^Hello Everyone (1620304070)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
8
GROUP AND ROUND IS:
(1, 'group_9')
ID38: ^invest edelim pls (1620304059)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
6
GROUP AND ROUND IS:
(2, 'group_1')
ID1: ^hani koyuyorduk..... (1620304304)^yapalm u ii (1620304348)
ID2: ^slm (1620304376)^bonkr arkadalara teekkrler (1620304406)
ID28: ^size guveniyrm (1620304307)^asr ayp (1620304331)
ID29: ^Hangi alak 0 verdi (1620304307)^Alcak* (1620304321)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(2, 'group_10')
ID15: ^basalm ya komple (1620304295)^verelim (1620304316)
ID16: ^100 vermiyor muyduk ya (1620304304)^ayip degil mi arkadaslar (1620304313)^han 100
ID17: ^arkadaslar 100 tane invest etmiyor muyduk (1620304320)^hepimiz daha cok kazanyoru
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
8
GROUP AND ROUND IS:
(2, 'group_2')
ID3: ^100 yatralm m hepimiz? (1620304295)^konuun ama aaa (1620304334)^konuun ama aaa (16
ID4: ^yaziklar olsun size (1620304333)^100 dedik (1620304349)^biraz utilitarian yaklasal
ID14: ^biraz invest edelim ekonomi canlansn (1620304320)^iyidir investment (1620304331)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7.5
GROUP AND ROUND IS:
(2, 'group_3')
ID5: ^yazklar olsun (1620304292)^insan gerekten hayret ediyor (1620304302)
ID7: ^ya ne zaman konutunuz grmedim ben (1620304334)
ID39: ^ben 100 dedim 100 verdim size feda olsun dostlar (1620304322)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(2, 'group_4')
ID6: ^olm.... (1620304288)^HAN 100 KOYUYODUK (1620304314)^memlekette gvenecek adam kalma
ID27: ^sizi seviyor 0 vereni knyor ve arttryorum (1620304305)^eveet (1620304329)^29 gzm
ID34: ^iki zara 100 binlik olmayalm urada en az 80 atmanz lazm (1620304308)^100 ok (1620
ID37: ^gerekten 100 verilmi (1620304305)^100 veriyorum bu sefer (1620304324)^+ alalm (16
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7
GROUP AND ROUND IS:
(2, 'group_5')
ID8: ^Bu olmad... (1620304292)
ID20: ^birlikten kuvvet doar diyorum arkadalar (1620304304)
ID30: ^deneme (1620304302)
ID31: ^Yazklar olsun 10 invest edenlere (1620304323)^o kadar dedik 100 diye yatrdk (1620
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7.5
```

```
GROUP AND ROUND IS:
(2, 'group_6')
ID10: ^dolandrc var (1620304296)^belliydi ama (1620304317)
ID25: ^lutfen hep birlikte kalknacagz (1620304337)^rica ediyorum (1620304349)
ID26: ^hepimiz 100 bu sefer (1620304318)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7
GROUP AND ROUND IS:
(2, 'group_7')
ID11: ^kardeim neden aq (1620304293)^0 verecem (1620304300)^bu nedir abi (1620304306)^0
ID18: ^ettim ben de (1620304340)^edelim yine iyi kazandk (1620304353)
ID32: ^abi herkes 100 versin (1620304289)^50 veren dostum pls (1620304311)^100 verelim (
ID35: ^arkadalar ben 50 basmtm bu round 100 bascam (1620304310)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7.5
GROUP AND ROUND IS:
(2, 'group_8')
ID12: ^ben guvenemedim ortaya karisik yaptm (1620304338)
ID24: ^bi biz miyiz enayi moruq (1620304326)
ID33: ^100 verelim (1620304299)^100 verelim (1620304303)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(2, 'group_9')
ID13: ^invest ediyorum ben de (1620304344)
ID38: ^ayp deil mi invest edelim diyip etmemek (1620304294)^ayp deil mi invest edelim di
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(3, 'group_1')
ID1: ^yazklar olsun sana (1620304488)^pis (1620304531)
ID2: ^:) (1620304522)
ID28: ^s (1620304495)^igrenccc (1620304508)
ID29: ^Bu kadari pes (1620304511)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
0
GROUP AND ROUND IS:
(3, 'group_10')
ID15: ^ticaret yapypruz elinizi korkak altrmayn (1620304521)
ID16: ^arkadaslar (1620304502)^hani 100 invest ediyoduk (1620304510)^ben mi yanlis oynuy
ID17: ^e boyle yapiyosak ben de yatirmiyim baskasina (1620304516)^e boyle yapiyosak ben
ID19: ^Guven tazeleme zaman bu tur (1620304480)^Guven tazeleme zaman bu tur (1620304519)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
6
GROUP AND ROUND IS:
(3, 'group_2')
ID3: ^100-100 anlasalim iste (1620304505)^evet ltfen ciddili 100 (1620304525)
ID4: ^yapmak zorundaydim (1620304476)^bu sefer ciddili 100er (1620304514)
ID14: ^yle olsun (1620304506)^herkes 0 girmese keke (1620304540)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
9
GROUP AND ROUND IS:
(3, 'group_3')
ID5: ^ben biraz ayp ettim bu tur sorry (1620304515)^imdi telafi ediyorum (1620304524)
ID39: ^:( (1620304508)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5.5
```

```
GROUP AND ROUND IS:
(3, 'group_4')
ID27: ^o 0 veren insaniyete cagryorum sen (1620304492)^hcbrmz m (1620304525)
ID34: ^0 veren kim recep tayyip erdoan m (1620304488)
ID37: ^0 veren arkadas, yaziklar olsun (1620304491)^nerde dayanisma (1620304505)^100 der
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5.5
GROUP AND ROUND IS:
(3, 'group_5')
ID8: ^bundan sonra boyle, guven kalmad... (1620304483)^ilk round'da caydlar, bu saatten
ID20: ^ben inancimi kaybettim (1620304499)
ID31: ^bitmi bi grup (1620304476)^bitik (1620304487)^ok ayp (1620304526)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
0
GROUP AND ROUND IS:
(3, 'group_6')
ID9: ^hepimiz neden 100 yatrmyoruz :D (1620304480)
ID10: ^biri 5 att ilk tur diye (1620304490)
ID25: ^gercekten beni hayal krklgna ugrattnz (1620304475)
ID26: ^gerekten ayp... (1620304475)^hibiriniz sznzde durmadnz... (1620304515)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
1.5
GROUP AND ROUND IS:
(3, 'group_7')
ID11: ^alin abi boyle daha mi iyi (1620304485)^100 verin (1620304506)^il tur 100 verdim
ID18: ^eyww yatrmayc eywww (1620304490)^bu bir takm oyunu (1620304511)
ID32: ^abi ayp deil mi ya, 0 veren arkada bi aklama yapmazsa direkt 100 atmicam haber ve
ID35: ^arkadalar ltfen 100 dedik bencil davranmayalm (1620304489)^hepimiz kazanalim (162
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
7
GROUP AND ROUND IS:
(3, 'group_8')
ID12: ^hepimiz basalm bence (1620304504)
ID22: ^0 yoktu ok iyi grupmu dedim ama hayat artmyor (1620304515)
ID24: ^hayat beklentiler olmazsa guzel sadece (1620304514)
ID33: ^winter is coming (1620304487)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(3, 'group_9')
ID13: ^bence de hepimiz invest edelim gerekten (1620304530)
ID38: ^nerde direni (1620304514)
ID40: ^yasasin kotuluk lol (1620304520)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
3
GROUP AND ROUND IS:
(4, 'group_1')
ID1: ^kim olduunu bilseydim keske... (1620304702)^kotusun (1620304717)
ID29: ^Puu size (1620304662)^100 vermeyen ruyasinda dabbe gorsun (1620304696)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
2
GROUP AND ROUND IS:
(4, 'group_10')
ID15: ^saglik olsun (1620304681)
ID16: ^biz niye iletisemiyoruz (1620304651)
ID17: ^100 tane verelim son tur bizim grup hadii (1620304649)
ID19: ^cok iyi gidiyoruz (1620304653)^cok iyi gidiyoruz (1620304680)^cok iyi gidiyoruz (
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
```

```
6
GROUP AND ROUND IS:
(4, 'group_2')
ID3: ^ciddili 100'd hani, en cok ben yatirmisim yine (1620304668)
ID4: ^yaziklar olsun size (1620304642)^vefa sadece bir semt adi (1620304664)^bir 0 eksik
ID14: ^daha fazla bir ey demicem (1620304645)^szm bitti (1620304653)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5
GROUP AND ROUND IS:
(4, 'group_3')
ID5: ^yav he he (1620304707)
ID21: ^surekli 0 veren arkadas yazklar olsun (1620304695)
ID39: ^son tur rational olan 0 invest etmek ama ben cizgimi bozmayarak 100 aticam (1620
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
4
GROUP AND ROUND IS:
(4, 'group_4')
ID27: ^yeter artk biraz kommun dusunce yahu (1620304678)
ID34: ^iyilik yap denize at (1620304668)^100 atmayan melih bulucudur (1620304689)
ID37: ^hic bisi diyemiyorum (1620304650)^prisoner dilemma eyv (1620304671)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
6
GROUP AND ROUND IS:
(4, 'group_5')
ID30: ^vay be :( (1620304642)
ID31: ^:D (1620304637)^bitmis buras ne diyim :D (1620304655)^gercekten (1620304680)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
0
GROUP AND ROUND IS:
(4, 'group_6')
ID25: ^para cebimize girmiyor (1620304671)^gelin hep beraber deneyi bozalim (1620304682)
ID26: ^cok guvendk gercekten brbrmze (1620304686)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
2
GROUP AND ROUND IS:
(4, 'group_7')
ID11: ^100 verin 100 (1620304674)
ID18: ^dost bildiklerimiz... (1620304652)
ID32: ^doslar keser doner sap doner umarim onceki el 0 veren arkadas memnundur durumdan
ID35: ^durustluk bozuldu galiba kimsenin kimseye inanc kalmams (1620304669)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
1.5
GROUP AND ROUND IS:
(4, 'group_8')
ID12: ^yok abi olmaz Boyle (1620304663)^ya kimse sznde durmuyor (1620304690)^100 verelim
ID24: ^slm (1620304661)
ID33: ^tamam, hep birlikte 80 yatrm yapalm (1620304710)^tamam, hep birlikte 80 yatrm yap
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
5.5
GROUP AND ROUND IS:
(4, 'group_9')
ID38: ^sylencek bii kalmad dayanma ruhu yok bu grupta (1620304683)
Give point for above conversation (0 for en ayrılıkçı - 10 for en işbirlikçi)
0
---------------------------------------------------------------------------
OptionError                               Traceback (most recent call last)
/usr/local/lib/python3.7/dist-packages/pandas/io/excel/_base.py in __new__(cls, path,
engine, **kwargs)
```

```
    632                 try:
--> 633                     engine = config.get_option(f"io.excel.{ext}.writer")
    634                     if engine == "auto":
```

6 frames

```
OptionError: "No such keys(s): 'io.excel..writer'"

The above exception was the direct cause of the following exception:

ValueError                                Traceback (most recent call last)
/usr/local/lib/python3.7/dist-packages/pandas/io/excel/_base.py in __new__(cls, path, engine, **kwargs)
    635                         engine = _get_default_writer(ext)
```

```
#sentiment_scores.to_excel("/content/drive/My Drive/EC 438 experiment/sentiment_scores.xlsx",
```

```
sentiment_scores = pd.read_excel("/content/drive/My Drive/EC 438 experiment/sentiment_scores.
```

```
sentiment_scores.sent_score = sentiment_scores.sent_score.astype(float)
```

SEARCH STACK OVERFLOW

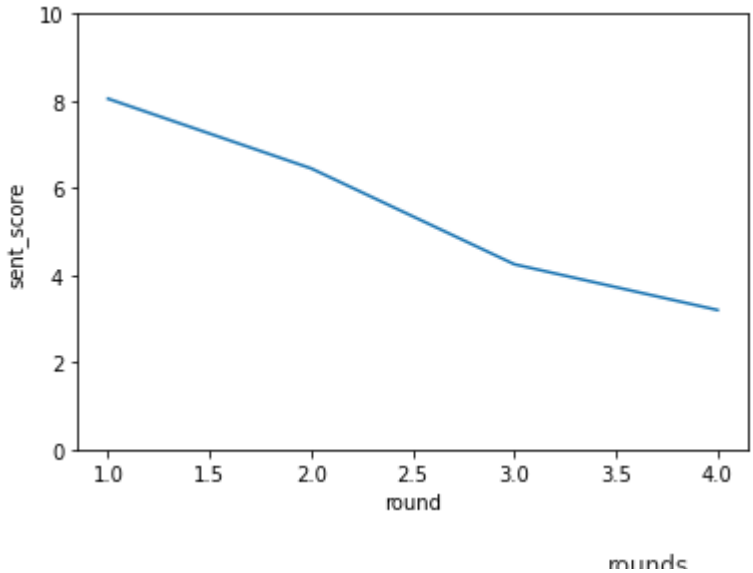
```
mean_sent = sentiment_scores.groupby("round").sent_score.mean()
```

```
sns.set(rc={'figure.figsize':(10,6)})
ax = sns.barplot(x=[1,2,3,4], y = mean_sent )
ax.set(ylim=(0, 10), title="Figure 3: Mean Sentiment Scores", xlabel="rounds" )
```

```
[(0.0, 10.0),
 Text(0.5, 0, 'rounds'),
 Text(0.5, 1.0, 'Figure 3: Mean Sentiment Scores')]
```

```
ax = sns.lineplot(data=mean_sent)
ax.set(ylim=(0, 10))
```

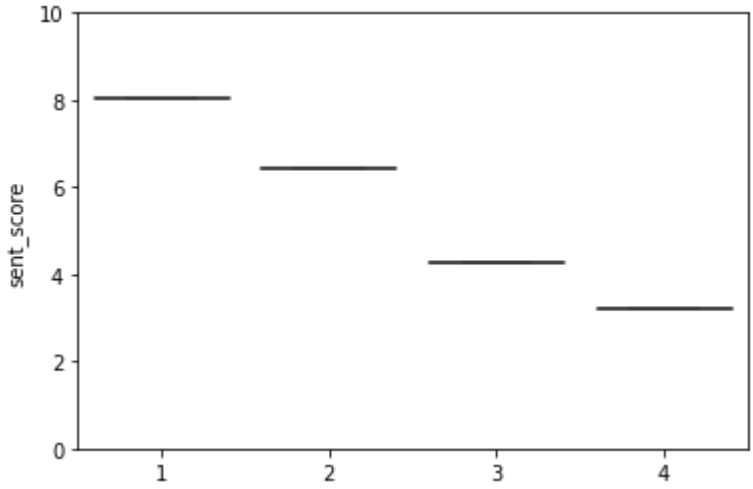
```
[(0.0, 10.0)]
```




```
ax = sns.boxplot(x=[1,2,3,4], y = mean_sent ,)

ax.set(ylim=(0, 10))
```

```
[(0.0, 10.0)]
```




```
sentiment_scores
```

	sent_score	round	group
0	9.0	1.0	group_1
1	7.0	1.0	group_10
2	5.5	1.0	group_2
3	8.0	1.0	group_3
4	9.0	1.0	group_4
5	9.5	1.0	group_5
6	10.0	1.0	group_6
7	8.5	1.0	group_7
8	8.0	1.0	group_8
9	6.0	1.0	group_9
10	5.0	2.0	group_1
11	8.0	2.0	group_10
12	7.5	2.0	group_2
13	5.0	2.0	group_3
14	7.0	2.0	group_4
15	7.5	2.0	group_5
16	7.0	2.0	group_6
17	7.5	2.0	group_7
18	5.0	2.0	group_8
19	5.0	2.0	group_9
20	0.0	3.0	group_1
21	6.0	3.0	group_10
22	9.0	3.0	group_2
23	5.5	3.0	group_3
24	5.5	3.0	group_4
25	0.0	3.0	group_5
26	1.5	3.0	group_6
27	7.0	3.0	group_7
28	5.0	3.0	group_8
29	3.0	3.0	group_9

30	2.0	4.0	group_1
31	6.0	4.0	group_10
32	5.0	4.0	group_2
33	4.0	4.0	group_3
34	6.0	4.0	group_4
35	0.0	4.0	group_5
36	2.0	4.0	group_6

3. Analysis

```
y_it = beta_0 + beta_1*score + F_i + T_t + u_it

TR1: y_it_1 = beta_0 + F_i + T_t + u_it_1
TR2: y_it_2 = beta_0 + beta_1*score + F_i + T_t + u_it_2

y_it_2 - y_it_1 = beta_1*score + u_it_3


tr1_data


contribution = beta0 + beta1*is_chat

tr_2_contr / tr_1_contr =  beta0 + beta1*cooperation_score + beta2*round

tr_2_contr = beta0 + beta1*cooperation_score + beta2*tr_1_contr

tr_2_contr = beta0 + beta1*cooperation_score + beta2*round

group_means = beta0 + beta1*group_cooperationscore



groups
```

	tr2_id	name	gm1	gm2	gm3	group
0	1	Elif Kurt	2	28	29	group_1
1	2	Ipek Gur	28	1	29	group_1
2	3	yunus emre bilgili	23	14	4	group_2
3	4	gokhan seheri	3	23	14	group_2
4	5	cem erciyastepe	21	7	39	group_3
5	6	su akarsu	27	34	37	group_4
6	7	Kaan Basdil	21	5	39	group_3
7	8	emrecan yerlikaya	30	31	20	group_5
8	9	Evrim Belli	25	26	10	group_6
9	10	oguz turan	25	26	9	group_6
10	11	Halit Metin	32	35	18	group_7
11	12	Ramazan Do ukan Oz	24	22	33	group_8
12	13	sonnur bas	40	36	38	group_9
13	14	elif canga	3	23	4	group_2
14	15	feritalperen ulker	16	17	19	group_10
15	16	oyku yilmaz	15	17	19	group_10
16	17	merve zeynep arici	15	16	19	group_10
17	18	Deniz Sertkan	11	32	35	group_7
18	19	Onur Boyaci	15	16	17	group_10
19	20	Merve yalin	30	8	31	group_5
20	21	meltem ozkan	5	7	39	group_3
21	22	Atakan Peker	12	24	33	group_8
22	23	Tayfur Kirilmaz	3	14	4	group_2
23	24	Mehmet Gorkem Oget	12	22	33	group_8
24	25	Mustafa Ozer	26	10	9	group_6
25	26	muhammed huzeyfe elden	25	10	9	group_6
26	27	dilara kurtoglu	34	37	6	group_4
27	28	iraz bolukbasi	2	1	29	group_1
28	29	Baran Demirtas	2	28	1	group_1
29	30	Cuneyt Soral	8	31	20	group_5

30	31	Lutfullah Cinar	30	8	20	group_5
31	32	emircan ince	11	35	18	group_7
32	33	velihan Baspinar	12	24	22	group_8
33	34	Batuhan Aktas	27	37	6	group_4

```
# ID correction for round 1:

for i in tr1_data.index:
  t1_id = tr1_data.loc[i, "ID"]
  tr1_data.loc[i, "ID"] =  groups.loc[groups.tr1_id==t1_id, "tr2_id"].values[0]


tr1_data = tr1_data.sort_values(by=["Round", "ID"]).set_index(["Round", "ID"])
tr2_data = exp_data.set_index(["Round", "ID"])


y = tr2_data.Contribution - tr1_data.Contribution


sentiment_scores.columns = ["sent_score", "Round", "group", "ID"]
sentiment_scores = sentiment_scores.set_index(["Round", "ID"])


y
```

```
Round  ID
1      1      75.0
       2       0.0
       3       0.0
       4      50.0
       5     100.0
              ...
4      36      0.0
       37      0.0
       38    -55.0
       39    100.0
       40      0.0
Name: Contribution, Length: 160, dtype: float64
```

```
sentiment_scores["constant"] = 1


sentiment_scores
```

		sent_score	group	constant
Round	ID			
1.0	1	9.0	group_1	1
	2	9.0	group_1	1
	3	5.5	group_2	1
	4	5.5	group_2	1
	5	8.0	group_3	1
...	...	...	...	...
4.0	36	0.0	group_9	1
	40	0.0	group_9	1

```
X = sentiment_scores[["sent_score"]]
```

```
sm.OLS(y, X).fit().summary()
```

OLS Regression Results

Dep. Variable:	Contribution	**R-squared (uncentered):**	0.111
Model:	OLS	**Adj. R-squared (uncentered):**	0.105
Method:	Least Squares	**F-statistic:**	19.86
Date:	Sun, 23 May 2021	**Prob (F-statistic):**	1.56e-05
Time:	20:40:16	**Log-Likelihood:**	-820.08
No. Observations:	160	**AIC:**	1642.
Df Residuals:	159	**BIC:**	1645.
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
sent_score	2.3384	0.525	4.457	0.000	1.302	3.375

Omnibus:	5.893	**Durbin-Watson:**	2.013
Prob(Omnibus):	0.053	**Jarque-Bera (JB):**	5.600
Skew:	0.451	**Prob(JB):**	0.0608
Kurtosis:	3.163	**Cond. No.**	1.00

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

```
# TR2 with dummy variables:
```

```
    tr2_data["cooperation_score"] = sentiment_scores.sent_score
    tr2_data = tr2_data.reset_index()

    round_dm = pd.get_dummies(tr2_data.Round)
    round_dm.columns = ["round_1", "round_2", "round_3", "round_4"]
    tr2_data = tr2_data.merge(round_dm, how="left", right_index=True, left_index=True)

    id_dm = pd.get_dummies(tr2_data.ID)
    tr2_data = tr2_data.merge(id_dm, how="left", right_index=True, left_index=True)
    tr2_data
```

```
                                                                  Cumulative      Other
tr2_data["constant"] = 1
                                                                                  ID2:0
sm.OLS(tr2_data.Contribution, tr2_data.drop(['Round','ID','Contribution','Earnings', 'Cumulat
```

OLS Regression Results

Dep. Variable:	Contribution	**R-squared:**	0.506
Model:	OLS	**Adj. R-squared:**	0.322
Method:	Least Squares	**F-statistic:**	2.760
Date:	Sun, 23 May 2021	**Prob (F-statistic):**	8.74e-06
Time:	20:51:41	**Log-Likelihood:**	-769.14
No. Observations:	160	**AIC:**	1626.
Df Residuals:	116	**BIC:**	1762.
Df Model:	43		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
cooperation_score	2.6324	1.631	1.614	0.109	-0.599	5.864
round_1	16.7935	7.629	2.201	0.030	1.683	31.904
round_2	12.9553	5.833	2.221	0.028	1.402	24.509
round_3	-1.4034	4.800	-0.292	0.771	-10.910	8.103
round_4	-12.9643	5.184	-2.501	0.014	-23.232	-2.697
1	20.2440	17.317	1.169	0.245	-14.055	54.543
2	-29.0060	17.317	-1.675	0.097	-63.305	5.293
3	-36.7451	17.315	-2.122	0.036	-71.040	-2.450
4	-4.4951	17.315	-0.260	0.796	-38.790	29.800
5	8.4663	17.175	0.493	0.623	-25.551	42.484
6	-12.3242	17.343	-0.711	0.479	-46.674	22.025
7	-34.0337	17.175	-1.982	0.050	-68.051	-0.016
8	-5.4141	17.269	-0.314	0.754	-39.618	28.789
9	4.7825	17.175	0.278	0.781	-29.236	38.801
10	-7.7175	17.175	-0.449	0.654	-41.736	26.301

```
sm.OLS(tr2_data.Contribution, tr2_data[["constant", "cooperation_score",  "round_1",  "round_
```

OLS Regression Results

Dep. Variable:	Contribution	**R-squared:**	0.166
Model:	OLS	**Adj. R-squared:**	0.144
Method:	Least Squares	**F-statistic:**	7.695
Date:	Sun, 23 May 2021	**Prob (F-statistic):**	1.11e-05
Time:	21:34:07	**Log-Likelihood:**	-811.02

```
#tr2 = beta_0 + beta_1*tr_1
```

```
#contribution_it = beta_0 + beta_1*is_chat + round_dummies + individual_dummies
```

	coef	std err	t	P>|t|	[0.025	0.975]

```
tr1_data = tr1_data.reset_index()
```

cooperation_score 1.8706 1.509 1.239 0.217 -1.111 4.852

HIPOTEZ 1: is_chat etkisi

Omnibus:	29.081	**Durbin-Watson:**	1.949

	Round	ID	Contribution	Earnings	Cumulative Earnings	Other Id:
0	1	1	25	245.00	255.00	ID11:0, ID5:50, ID12:20
1	1	2	0	293.00	303.00	ID2:0, ID20:93, ID28:0
2	1	3	0	350.00	360.00	ID1:0, ID40:50, ID30:100
3	1	4	50	250.00	260.00	ID7:0, ID1:0, ID30:100
4	1	5	0	277.00	287.00	ID10:2, ID24:75, ID39:0
...	...	...	...	...	...	...
155	4	36	0	260.00	1,015.00	ID3:0, ID21:0, ID8:60
156	4	37	0	200.00	1,189.00	ID17:0, ID9:0, ID26:0
157	4	38	55	335.00	1,279.00	ID38:30, ID6:60, ID36:100
158	4	39	0	260.00	1,415.00	ID3:0, ID33:0, ID8:60
159	4	40	0	*.**	*.**	ID37:**, ID25:**, ID15:**

160 rows × 6 columns

```
# TR1 with dummy variables:
tr1_data["constant"] = 1

round_dm = pd.get_dummies(tr1_data.Round)
round_dm.columns = ["round_1", "round_2", "round_3", "round_4"]
tr1_data = tr1_data.merge(round_dm, how="left", right_index=True, left_index=True)
```

```
id_dm = pd.get_dummies(tr1_data.ID)
tr1_data = tr1_data.merge(id_dm, how="left", right_index=True, left_index=True)
tr1_data
```

	Round	ID	Contribution	Earnings	Cumulative Earnings	Other Id:	constant	round_1	round_2
0	1	1	25	245.00	255.00	ID11:0, ID5:50, ID12:20	1	1	0
1	1	2	0	293.00	303.00	ID2:0, ID20:93, ID28:0	1	1	0
2	1	3	0	350.00	360.00	ID1:0, ID40:50, ID30:100	1	1	0
3	1	4	50	250.00	260.00	ID7:0, ID1:0, ID30:100	1	1	0
4	1	5	0	277.00	287.00	ID10:2, ID24:75, ID39:0	1	1	0
...	...	...	...	...	...	...	...	...	...
155	4	36	0	260.00	1,015.00	ID3:0, ID21:0, ID8:60	1	0	0
156	4	37	0	200.00	1,189.00	ID17:0, ID9:0, ID26:0	1	0	0
157	4	38	55	335.00	1,279.00	ID38:30, ID6:60, ID36:100	1	0	0
158	4	39	0	260.00	1,415.00	ID3:0, ID33:0, ID8:60	1	0	0
159	4	40	0	*.**	*.**	ID37:**, ID25:**, ID15:**	1	0	0

160 rows × 51 columns

```
tr2_data
```

	Round	ID	Contribution	Earnings	Cumulative Earnings	Other Id:	cooperation_score	round_1
0	1	1	100.0	300.0	310.00	ID2:0, ID28:100, ID29:100	9.0	1
1	1	2	0.0	500.0	510.00	ID28:100, ID1:100, ID29:100	9.0	1
2	1	3	0.0	315.0	325.00	ID23:0, ID14:15, ID4:100	5.5	1
3	1	4	100.0	115.0	125.00	ID3:0, ID23:0, ID14:15	5.5	1
4	1	5	100.0	210.0	220.00	ID21:10, ID7:0, ID39:100	8.0	1
...	...	...	...	...	...	...	...	..
155	4	36	0.0	270.0	1,000.00	ID40:0, ID13:70, ID38:0	0.0	0
156	4	37	0.0	300.0	1,280.00	ID27:0, ID34:100, ID6:0	6.0	0
157	4	38	0.0	270.0	1,000.00	ID40:0, ID36:0, ID13:70	0.0	0
158	4	39	100.0	189.0	814.00	ID21:89, ID5:0, ID7:0	4.0	0
159	4	40	0.0	270.0	1,300.00	ID36:0, ID13:70, ID38:0	0.0	0

```
tr1_data["treatment"] = 1
tr2_data["treatment"] = 2

tr1_data["is_chat"] = 0
tr2_data["is_chat"] = 1


all_data = tr2_data.append(tr1_data, ignore_index=True)


all_data = all_data.sort_values(["treatment", "Round", "ID"]).reset_index()
all_data
```

	index	Round	ID	Contribution	Earnings	Cumulative Earnings	Other Id:	cooperation_score
0	160	1	1	25.0	245.00	255.00	ID11:0, ID5:50, ID12:20	NaN
1	161	1	2	0.0	293.00	303.00	ID2:0, ID20:93, ID28:0	NaN
2	162	1	3	0.0	350.00	360.00	ID1:0, ID40:50, ID30:100	NaN
3	163	1	4	50.0	250.00	260.00	ID7:0, ID1:0, ID30:100	NaN
4	164	1	5	0.0	277.00	287.00	ID10:2, ID24:75, ID39:0	NaN
...	...	...	...	...	...	...	...	...
315	155	4	36	0.0	270	1,000.00	ID40:0, ID13:70, ID38:0	0.0
316	156	4	37	0.0	300	1,280.00	ID27:0, ID34:100, ID6:0	6.0
317	157	4	38	0.0	270	1,000.00	ID40:0, ID36:0, ID13:70	0.0
318	158	4	39	100.0	189	814.00	ID21:89, ID5:0, ID7:0	4.0
319	159	4	40	0.0	270	1,300.00	ID36:0, ID13:70, ID38:0	0.0

320 rows × 55 columns

```
all_data = all_data.drop(["index", 'Earnings', 'Cumulative Earnings', 'Other Id:'],1)
```

```
sm.OLS(all_data.Contribution, all_data[["constant", "is_chat"]]).fit().summary()
```